



Government of Nepal
Ministry of Energy, Water Resources & Irrigation
Department of Water Resources & Irrigation
 Bagmati Improvement Project
 Project Implementation (Irrigation Unit)
 Guheshwori, Gaurighat, Kathmandu

Technical Specification of Automatic Weather station Sensor

The set of automatic weather station comprises following items of works. The purpose of installation of this work is to acquire weather data for the use of operation of Reservoir and dam safety purposes. The location of instrumentation is 85° 27' 21" E, 27° 48' 18" N and altitude is 2080 . The power source at present is not available but we are planning to manage 3 phase electric power within this fiscal year 2077/78. The data should be remotely accessible through server of DHM and another independently usable to this unit office.

Technical Specification of Automatic Weather station Sensor	
Precipitation (Automatic Rain gauge) or tipping bucket	
Type of Sensor	Tipping Bucket / Reed Switch
Bucket Tip/sensitivity	0.2mm /tip
Output	0.1s switch closure or bette
Accuracy	+/- 2% 0 to 250mm/hr. and +/-3% for other
Switch	Rugged Magnetic Proximity Switch (Reed Switch)
Collecting Area	8 inch knife edge collector rim (314 cm ²)
Operating Environment	4 to +60 °C
Power Supply	5 to 16 VDC or better
Accessories	Cable 15, Mounting Kit, Tipping Bucket to tower etc.
Output Interface	SDI 12/ pulse count
Materials	Anodized Aluminum or stainless still or brass
Warrenty	Minimum 1 year
Technical Specification of Automatic Weather station Sensor	
Temperature Parameter	
Sensor Type	Platinum resistance Thermometer (Pt100) Class B
Measurement Range	-30 to +60 °C or better
Accurcy	±0.1°C
Resolution	0.01° C
Long-term stability	<0.2 °C / year
Humidity Parameter	
Sensor Type	Hygromer capacitive
Probe Type	Standard probe
Range	0 – 100%
Accuracy	± 2 % Rh; 0°c to 50°c ± 4 % Rh; -40°c to 0°c
Operating Temperature Range	-40 to +60 °C
Output	RS485 or RS232 or SDI-12
Long-term stability	< ± 2 % Rh/year or better
Others	
Power Supply	5 to 16 VDC or better
Output interface	RS485 or RS232 or SDI-12
Traceable Standard	NIST or NPL or equivalent standards
Compliance	WMO compliant
Warrenty	Minimum 1 year

Moisture, temperature and conductivity of soil	
Sensor type *	Pt 100 for soil temperature and permittivity sensor for soil moisture
Soil Moisture Accuracy	± 0.01 WfV for most Soils ± 0.03 maximum for fine Texture Soils
Dielectric Constant Accuracy	± 1.5% or 0.2 whichever is Typically greater
Conductivity Accuracy	± 2.0% or 0.005 S/m whichever is Typically greater
Temperature Accuracy *	± 0.3o c
Interface	SDI 12 or RS 485
Power	<1ma idle/ 30 ma active
Operating temperature	-10oc to +55oc
Speed and Direction of Wind	
Wind Speed	
Sensor Type	Ultrasonic
Measuring range	0 to 75 m/s or better
Starting threshold	+/- 0.3 m/s or +/- 3% of rms reading
Accuracy	± 0.2 m/s or 2% of reading (whichever is greater)
Resolution	0.1 m/s or better
Wind Direction	
Measuring range	0 to 359.9 Deg or better
Accuracy	+/- 2 % RMSE
Resolution	1 degree
Cable length for both	12m
Starting threshold	0.1 m/s
Output signal:	RS 485 or SDI 12
Operating Voltage	9 to 30V or better
Protection type and Housing	IP 66, Aluminum, seawater proof or better
Permissible Temp	-30 to +60 °C
Power Supply	5 to 16 VDC or better
Standard for traceability	Traceable to international standards like NAMAS
Approval	WMO Compliant
Warranty	Minimum 1 year
Solar Radiation	
Sensor Type	Pyranometer, Thermopile
Spectral Range	300-2800nm
Digital Output	SDI-12 or RS485
Analogue Output Range	Maximum 2000 W/m2
Long term stability	± 1%/Year
Field of view	180 degree
Operating temperature	-30 to +80 oC
Humidity Range	0 to 100%
Supply Voltage	5 to 16VDC or better
Output Interface	RS 485 or SDI 12
Non Linerarity	<1% (100-1000Watt/m2)
Traceability	World radiation reference (WRR)
Warrenty	Minimum 1 year
Digital Evaporation Pan	
Dimension:	1200mm diameter x 250mm height
Level measurement range:	0 to 200mm
Water Level accuracy:	0.2mm
Water level linearity:	±0.05%FS
Resolution:	0.1mm
Operating temperature:	-40 to 60° C
Bird cage:	Should be included

Support:	Shuld include wooden platform
Modem	
Dual SIM	Should supprot two SIM's from two mobile operators.
2G connectivity:	900 and 1800Mhz
3G connectivity:	900 and 2100Mhz
Port:	Compability with the data logger
Temperature:	-40 to 60° C
Data Logger	
Interface:	To accomodate all offered sensors and 10 more sensors
Analog data resoution:	24 bits
Communication port:	RS232
Data Sampling:	1 minute to 24 hours
Extended memory:	Using microsd card
Temperature range:	-40 to +70
Logging Paramters:	All paramters should be posted to the serer according to list provided.
Data Posting:	Sumultaneously to two diffent servers; One to DHM server and the other to hosted server .
Wind Mast (3m height)	
Particulars	Description
Material 8	Hardened down Aluminum alloy or galvanized iron
Round Pipe (total length 10m)	Lowest section (0 ... 1.9 m) 100 mm Second section (1.9 ... 4.9 m) 75 mm Third section 63 mm Highest section 50/60 mm Top of the mast 60 mm (this is according to DKP 210) please fill the details as in your mast design
Hinge base and bolts	Stainless steel or galvanized iron
Guy wire(optional)	3 sets stainless steel
Tilting support	Should be tilt-able even after installation (by max. 2 person)
Winch for tilting during installation and maintenance (only if required)	According to the mast supplied
Solar Panel Including mounting structures, Battery and Solar Charger	
a.Solar Panel	
Particulars	Description
Solar Cell	Mono or poly Crystalline Silicon Module
Front Glass	High Transmission tempered glass with anti-reflective (AR) Coating
Front Glass Thickness	> 3mm
Output Cable	4 mm ² Cable / Multi-Contact (MC4)
Efficiency	>15% (module)
Output Volt	12 V
Output Power	40W
Normal Operating Cell Temperature	-40°C to 85°C
Impact Resistance	Hail 25mm dia at 25 m/s of speed
Hi performance at low irradiance	Above 80 %
Certifications	ISO, CE certified
b. Battery	
Output Voltage	12V
Type	VRLA
Amp	75 AH @ C10

Certifications	ISO, CE
c. Solar Charger	
Max. PV Array Power	40 Watt
PWM/MPPT Range Operating Voltage	12 VDC
Max. Charging Current	5 amp
Max. Efficiency	Not less than 90%
Protections	Should have protection against short circuit, over voltage etc. Should be able to monitor solar voltage, battery voltage etc via a digital interface RS485 or Sdl-12 port.
d. Accessories	
Panel Fitting Accessories	*As per required for corresponding size and weight of the panel. *Support frame structures must be made of corrosion resistant metallic frame; i.e. aluminum with minimum thickness of 3mm or greater. *Height of mounting pole must be at least 30 cm from the holding surface. *The support frame structure and Mounting pole should be able to withstand wind speeds of minimum of 85 km/h to be able to resist at least 20 years of outdoor exposure without suffering significant damage or corrosion.
Cables	*Cable used should meet Nepal Standard or International Quality Standard Certified. *Cables must be color-coded or with proper polarity identification code in accordance with the existing electric coding norms. *Cables between the PV module and charge controller must be waterproof and UV resistant
Switches, Sockets and Protections	*DC sockets must be used with a reverse polarity protection or three pin DC sockets must be used. *Switches must be certified according to the standard NS or International Quality Standard Certified.
Others	For daily operation of the solar power system, the suppliers shall have the responsibilities to train local users
Warranty	at least 10 years for Solar Panel, 3 Years for Battery, 1 Year for Solar Inverter and 1 Year for Solar Charger
180 ° Panoramic Camera Station with power supply	
Field of view horizontal	180°
Field of view vertical:	90°
Resolutio:	5Mp
Data Transmission:	Push images to a server every 15 mins to 1 hour.
Connectivity:	Using GPRS/3G , Wifi and Ethernet
Memory:	Shoudl have atleast 8GB to store the images when there is no internet.
Power Supply:	Seperate battery and solar panel for the camera
Battery:	LiFePo4 Battery with backup for 5 days.
Solar Panel:	The solar Panel should be able to charge full battery wtihin two days.
Fencing with lockable gate	
Fencing type and Area:	Chain link fencing work, supported by concreted foundation. 6m x 6m
Gate:	Galvanized gate strcuture (4' X 6')
Fence height:	1.8m (over GL)